

## Flyby or soft landing

Last week the Soviet Union launched another interplanetary space probe, Venus 7, on a soft-landing mission to that planet. According to the Soviet news agency TASS, the "improved space station" will reach the planet in late December, when equipped with parachutes, it will begin its descent to the surface. Venus 7 is twice the weight of the first Venus craft.

The last Soviet probe of another planet was in May, 1969, when Venus 5 and 6 penetrated the Venusian atmosphere and radioed back information during descent.

These craft radioed to earth atmospheric temperatures at 20 kilometers above the surface to be 320 degrees C. From Venus 5 and 6 measurements Soviet scientists calculate the surface temperature to be about 500 degrees C.

## PLANETARY MISSIONS

### United States plans

Periodically, the planets in the solar system are so aligned that one spacecraft can go to several planets by using one planet's gravitational field to propel it toward another. This method not only shortens flight time, but makes long missions feasible with the present launch rockets. The Grand Tour of the outer planets proposed for 1977-79 (SN: 3/14, p. 265) would take advantage of this alignment.

Venus and Mercury will be in line four times during this decade, but two of these launch opportunities would require a spacecraft velocity change at Venus. The opportunities to use the Venusian gravity occur only twice: this month and in the fall of 1973.

In October or November of 1973, the National Aeronautics and Space Administration will launch a spacecraft that will arrive within 3,300 miles of Venus in February 1974 and, using the Venusian gravitational field, arrive at Mercury in March.

The spacecraft will carry a 113-pound scientific instrumentation package. Two television cameras, equipped with telescopes, will give high resolution pictures of the planets as clear as those of the moon from earth-based telescopes. Over 5,700 frames of Venus and 2,740 of Mercury will be taken. Scientists will also try to photograph the ultraviolet clouds which appear to circle Venus every five days.

Other instruments will measure the ions and electrons and the interaction of the solar wind with Mercury and Venus.

## SPACE MEDICINE

### Integrated system

Two preliminary designs of a space system called IMBLMS (Integrated Medical and Behavioral Laboratory Measurement System), which will assess physiological, behavioral, microbiological and biochemical changes of man in space, are being tested at NASA's Manned Spacecraft Center at Houston, Tex.

The system is the result of a seven-year research project to design a self-sufficient biomedical facility as a single onboard system for measuring and processing data. The system will measure 10 or more bodily func-

tions; it will include a control and display panel for each area and a computer to store, display, compress, analyze and transmit data collected by the measurement facilities.

Tests to measure plasma volume, electrolytes, blood glucose, body microflora, memory, vision, energy metabolism, cardiac output, lung volume and body mass are among those tests which could be plugged into the system.

"IMBLMS is based on an Erector-set idea," says Dr. Sherman P. Vinograd, director of the project at the National Aeronautics and Space Administration. "It can be assembled or changed according to the biomedical concerns of the flight, or current findings."

Both General Electric and Lockheed have designed the preliminary models. The finished version could be ready to fly in 1973 on a Skylab B flight or later in a space station.

## SONIC BOOM

### Research at low Mach

Aeronautical engineers have indications from prior research that it is possible to operate an aircraft at lower than designed speeds, but slightly above the speed of sound, without producing sonic booms that disturb anyone on the ground. However, atmospheric factors such as weather, temperature and air pressure are related to this phenomenon.

To investigate these parameters, engineers from the National Aeronautics and Space Administration's Langley Research Center at Hampton, Va., are conducting test flights at the Atomic Energy Commission's Nevada test site. Pilots are flying F-104's over a 1,500-foot-high tower instrumented with 15 microphones. At the base of the tower, 16 more microphones have been spaced in a horizontal straight line. These will be used to monitor the low intensity booms.

Pilots will fly the craft between Mach 1.05 and 1.3. These are threshold speeds at which the sonic boom cuts off or dissipates in the atmosphere.

## PIONEER

### Two trips to Jupiter

Two spacecraft, Pioneers F and G, will be launched—one in February or March 1972, and the other in April 1973—on two-year journeys of half a billion miles to Jupiter.

Each craft will spend a week circling the planet at a distance of about 100,000 miles. At least 13 scientific experiments aboard each will gather information on a number of mysteries and scientific questions which surround the planet: the dense layer of clouds which form blue and pink bands; the huge Red Spot which drifts slowly around the planet; the surges of radio noise emitted (see p. 168) and the 12 moons of Jupiter, three of which are larger than the earth's moon.

Instruments will measure Jupiter's radiation belts, magnetic field and bow shock wave. An imaging photopolarimeter will take images of Jupiter that can be built into photographs.

These spacecraft will be the first United States probes to penetrate the asteroid belt, which circles the sun 180 million to 330 million miles out.